1: Freeman E-5 (1949-1951)1955 OC6 Iban OC6

137 confines his attention to hill-sides and ridges up to about 1,000 feet in height. The
311 felling and firing of virgin forest involves great havoc, but regeneration begins almost at once, and within a few weeks of the completion of the *padi* harvest, the land is often substantially covered with a vigorous growth of young plants. After three to four months, recuperation is well advanced, and the farm has then reached the *krukoh* stage. On 23rd August, 1949, together with Mr. B. E. Smythies (then Forestry Officer, Third Division), I visited a number of farms belonging to members of Penggulu Jenggut's house in the lower Batang Baleh. One of these farms was at the *krukoh kampong* stage, i.e. virgin forest had been felled about 13 months previously and one crop of *padi* had been taken from the land. Mr. Smythies has described this patch of *krukoh kampong* in these words: "There was ample and vigorous regeneration of tree species, both by coppice shoots and by growth from seedlings; a few ferns had sprung but no *lalang* or other weeds, and it was obvious that a complete cover of trees and shrubs would be established in another one or two years if left undisturbed".[1] It should be mentioned that this patch of *krukoh kampong* was within half a mile of a *lalang* infested area of derelict land (*tanah kusi*) presently to be discussed.

294. Mr. Smythies' words might also have been written of any of the other tracts of *krukoh kampong* which I examined in various parts of the Baleh region. Moreover, judging from observations made at Rumah Nyala, regeneration subsequent to the *krukoh* stage is even more rapid than Mr. Smythies predicts. I was able, for example, to follow the recuperation of *kampong* land which had been cleared and farmed in 1949-50; by February, 1951, that part of the land not cultivated again in 1950, had reached the stage known as *dijap kampong*. This *dijap kampong* had become (about nine months after the harvest of 1950) a dense thicket of thriving plants, many of the young trees being eight feet and more in height (Plate 23). There can be no doubt that, if unmolested, this *dijap* would become healthy secondary jungle. The composition of such secondary jungle (*damun*) is, of course, very different from that of the original rain-forest. A study of the different types of plant association which result from Iban methods of *padi* cultivation would provide many fascinating problems for the plant ecologist. All that need concern us here however, is the important fact that secondary jungle which springs up after the taking of one crop from *kampong* land, is vigorous and healthy, containing very few noxious weeds.

Erosion

134 295. Although there is very little trustworthy evidence, such as does exist suggests that when only one crop is taken from virgin land, there is very little erosion. When virgin land is being farmed, the surface is only seriously exposed for one or two months after firing, and even during this period there is a protective layer of humus, ash, and partially burnt logs and boughs. As soon as the harvest is over a cover of young plants begins to establish itself. The only thorough study of erosion under conditions of shifting cultivation, of which I am aware, was that carried out by the Forestry Service of the Indies, at an experimental station

as follows: "Botanically very complex, comprising 2,000 or more species. Climbing palms (rattans) and numerous species of large vines (lianas) occur; bamboos scarce, though climbing bamboos occur here and there. Many tree species carry a large epiphytic flora on their trunks and branches, e.g. ferns, mosses, orchids. The forest floor, owing to rapid oxidation, does not carry a thick layer of leaves and humus."
(For this note I am indebted to B. E. Smythies, Esq.).

[1] B. E. Smythies, MSS., 30th August, 1949.

1: Freeman E-5 (1949-1951)1955 OC6 Iban OC6

near Tjiwidej, in West Java. Two adjacent parcels of forest land, lying on rather steep slopes, at an altitude of 1,800 metres, were selected for study. Each was drained separately, and at the foot of each slope, elaborate catch-basins were constructed, so that the run-off of water could be measured and the amount of sediment weighed. One piece of land was terraced, and the other left in its natural state. Pelzer reports: "During the first year both parcels lost very little soil because the humus layer protected it; but in the second year the unterraced parcel lost 5·065 kg. of silt per square metre, whereas the terraced parcel lost only one-half as much, or 2·524 kg."[1]

296. At Rumah Nyala I did not have the facilities to make a controlled study of erosion, but my impression was that when virgin jungle is cultivated *for one season only*, erosion is very slight indeed. Erosion, I would suggest, only becomes serious when land is farmed for two or more years in succession, or when the cycle of cultivation becomes too short.

The Effects of Shifting Cultivation on Soil Composition and Structure

297. A valuable study of the effects of shifting cultivation on soil composition and structure has been made in Ceylon by Dr. A. W. R. Joachim and S. Kandiah.[2] (In Ceylon, shifting cultivation is known as the *chena* system). The conclusion reached after most detailed investigation is that there are "no adverse effects on soil structure expressed as percentages of total crumbs or true crumbs, as a result of chena-ing forest land . . . . Thus chena land on abandonment is both from the fertility and structural points of view in much the same condition as any other land that is utilized for rotation cultivation".[3]

The Factor of Weed Growth

298. Joachim and Kandiah go on to ask why it is that the native farmer adopts the system of shifting cultivation. "The answer", they write, "is weed growth, which is beyond the capacity of the chena cultivator to tackle by hand and to control, while, implements, were he able to obtain them, cannot be used owing to the presence of stumps on the land".[4] These conclusions are for Ceylon, and it does not follow that they are valid for shifting cultivation as practised in Sarawak, comparable though it be to the chena system. This question can only be settled

[1]Karl J. Pelzer, "Pioneer Settlement in the Asiatic Tropics: Studies in Land Utilization and Agricultural Colonization in Southeastern Asia," New York, 1945, p. 32. For a detailed report of the erosion experiment at Tjiwidej, see: L. Gonggrijp, "Het erosie-onderzoek," Tectona, Buitenzorg, Vol. 34, 1941, pp. 200-220.

[2]Dr. A. W. R. Joachim and S. Kandiah, "The Effects of Shifting (Chena) Cultivation and Subsequent Regeneration of Vegetation on Soil Composition and Structure," Tropical Agriculturist, Vol. 104, 1948, pp. 3-11.

[3]One significant aspect of shifting cultivation is the effect of heating on soil fertility, "not only is the productivity of the soil increased by partial sterilization, but there is also an increase in the rate of growth of plants grown in such soils."

Dr. H. W. Jack (writing in 1923) comments: "These phenomena have only been discovered in the last decade and yet the hill *padi* planter has taken advantage of them, probably for hundreds of years, in the practice of burning the scrub and timber on his clearings and thus unconsciously increasing the productivity of his land by the partial sterilization which such heating of the soil affords." (Ref.: H. W. Jack, "Rice in Malaya," Malayan Agricultural Journal, Vol. 11, 1923, p. 126.)

[4]Joachim and Kandiah (1948) *op. cit.*

Cf. Allsop, F., "Shifting Cultivation in Burma," Proceedings of the Seventh Pacific Science Congress, vol. VI, 1953, p. 278: "Local conditions determine whether or not a clearing is cultivated for one season or more. The vigour of the weed growth, particularly in the warmer lands, sometimes makes it impossible to obtain a crop after the first season, except by expenditure of more energy than the cultivator is prepared to exert."

1: Freeman E-5 (1949-1951)1955 OC6 Iban OC6

243 137 22. This photograph shows the steepness of the hill-sides that are sometimes cultivated by the Iban. The felled trees are those of mature secondary jungle (*damun*). Photograph taken on 15th October, 1949, about three weeks after the burn which was a very poor one; Sungai Sut, Kapit District.

137 23. The growth in the background is *dijap kampong* about nine months in age: an example of regeneration from virgin land (*kampong*) which had been farmed for the first time during the previous year. The land in the foreground, from which the *padi* has just been reaped, has been cultivated for two years in succession. Photograph taken on 21st February, 1951; Sungai Sut, Kapit District.

137 134 24. The evils to which excessive cultivation leads: erosion and the invasion of the land by Imperata and other weeds. (Sheet erosion such as this is rare on Iban farms however, and this was the worst case encountered). Photograph taken on 3rd December, 1949; Sungai Tiau, Ulu Mujong, Kapit District.

1: Freeman E-5 (1949-1951)1955 OC6 Iban OC6

p. 146 l

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Plate 23. The growth in the background is regeneration (about 9 months in age) from virgin jungle after a single cropping.

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Plate 24. The evils to which excessive cultivation leads: erosion and the invasion of the land by Imperata.

3: Low G-5 (1844-1847) 1848
OC6 Iban OC6

Dyaks of Pedungan. The village established here is well built, and contains about sixty families; it is not fortified in any way, though the Dyaks possess some small brass guns. The other divisions of the tribe, which are equally under the protection of the government of Sarawak, have villages on the Samarhand and Sadong rivers, but many little clusters of houses are to be found scattered about in the country near the mouths of the above-named streams, nominally belonging to the tribe, though not residing at any of the principal villages. The Dyaks of Lundu have been a pet tribe of Mr. Brooke's, on account of the heroic gallantry displayed by them and their chief on many occasions of difficulty and danger. The conduct of the orang kaya, and his assistance to Mr. Brooke in the Seniawan war, are fully detailed in the Hon. Captain Keppel's work, whom they also accompanied in his expeditions against Sakarran and Sarebas, which are their favourite places of attack, they being always anxious to revenge themselves on these people, who have caused them so much loss and trouble during their residence in their former villages.

The country occupied by the sea Dyaks on the great rivers is generally flat towards the sea, but more undulating in the interior. It is covered in many parts with dense forests, and the soil is rich and productive, so that, when peaceably disposed, they are large exporters of rice, and all kinds of fruits are abundant and very cheap in their districts. As far as is yet

13 ecological adaptation of the Ibans, Chinese and other groups has been made in terms of that environment. A century ago, the Sibu District was covered with virgin jungle cut by a labyrinth of streams and large navigable rivers. Unlike the fertile areas of Java which benefit from what Geertz (1963-38), citing Mohr, has called a

> "happy combination of . . . the four elements of the ancient world: fire, water, earth, and air,".

the environment of the Sibu District offers no such happy combination. Nevertheless, certain resources have been found and from the exploitation of these the ways of life in rural and urban areas have been developed.

153 1. Soils

> "The greater part of Sarawak is geologically very young, and well over four-fifths of the State comprises Tertiary and Quarternary sediments" (Jackson 1968-16).

• 134 The Sibu District is composed of deposits laid down during the Quarternary Period, principally of podsolics and peat soils. On the "Soil Map of Sarawak, Malaysia Timor, 1968," published by the Agriculture Department, the District is almost uniformly described as consisting of "mainly deep peat soils" (Histosols). In areas near the mouths of the principal rivers of the Third Division, there is little other soil than peat. Farther upriver and in the Sibu District, the peat swamps are broken up by hills of podsolics, shales and other soils.

134 I. M. Scott, a soil surveyor working with the Agriculture Department, has published a number of reports based on his analyses of the soil types in the District, including areas along the Oya and Durin Roads, and the Lassa-Igan areas. In his report on a soil survey of 33.3 acres at the 22nd Mile, Oya Road, Scott writes that

> "none of the soils is chemically rich" (1964-12).

[133] The entire area isunderlain by a complex of shale, sandstone and quartz veins.

> "The most widespread profile form developed in the upland soils . . is a yellowish brown clay or clay loam grading downwards to a somewhat heavier-textured and generally more reddish-coloured zone, the latter overlying or incorporating gravelly material."

"Sandy clay loams," "sandstone bands," "peats and mucks," and "poorly drained alluvial soils," characterize the survey area and, to a high degree, are representative of the District.

With rare exceptions, the soils of the District are generally poor for the purposes of cultivating rice, the primary food of the people of Sarawak. The hilly areas are subject to leaching, a phenomenon common in tropical countries where nutrients do not accumulate in the soil because the rain causes them to percolate down. Cultivation which severely disturbs the soils or is done too frequently without adequate periods of fallow hastens the processes of leaching that depletes

18:Sutlive E,M-5 (1957-1971) 1973 OC6 Iban OC6
Sibu

the stocks of soluble nutrients and minerals and reduces the organic matter present.[1] As a result, many parts of the District are covered with deserts of lalang (Imperata cyclindrica), a coarse grass common in other areas of Southeast Asia, resam (Gleichenia dichotma), an inedible fern, and other scrub which can survive in the relatively barren soil (tanah kusi) which cannot recover and accumulate nutrients because of inadequate cover.

In lowland areas, the bacteria which normally cause organic decay cannot function due to poor drainage and high temperatures. Instead of rotting, leaves, twigs, and other dead vegetable matter piles up in layers of highly acid peat (tenah rau), accumulating to depths of seventy-five feet in some places as, for example, at the 8½ mile, Oya Road. Even when drained, peat soils are sour (masam) and not arable because of the highly acid condition. Such soils comprise 2,322 square miles of the Third Division, about one-quarter of the Sibu District (Anderson, 1964-69).

Exceptions to be noted occur where pockets of igneous rock are

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[1] After decades and reams of criticism of the shifting cultivator and his techniques for laying waste the land, some agriculturalists now admit that such techniques are the only viable ones given local conditions. On this point, Spencer notes that ". . . under normal conditions, the tropical cultivator traditionally has disturbed his soil as little as possible. The judgement that Asian shifting cultivators are primitive, inefficient, or lazy because they do not fully turn the soil at every break in the cropping cycle is misinformed" (1966-6).

18:Sutlive E,M-5 (1957-1971) 1973 OC6 Iban OC6
Sibu

134 found and where alluvium is deposited by overflowing rivers. Examples of the former are found in the area of the 6th mile, Durin Road, where farms produce outstanding yields of rice though cultivated year after year. The latter conditions occur on the banks and promontories of the Batang Igan, especially between Sungai Merah and Tanjong Penasu, where annual deposits of alluvial soils replenish the nutrients at the expense of upriver lands whence the soils have eroded. Farmers in those areas on the Igan profitably cultivate the same plots annually.

Generally, however, the soils in the Sibu District are relatively poor for frequent cultivation, a fact which becomes more important in light of population increases and shorter periods of fallowing, and the farmer who is able to grow enough rice to last him from one harvest to the next is one of a minority.[2]

2. Water

132 133 The data from the meteorological station in Sibu provide information which may be taken as representative for the District, and reveal a highly erratic picture of rainfall and flooding. With only a few interruptions, records exist for the past 33 years and a summary of

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[659] [2] The Welfare Department supplied an average of three kati (1-1/3 pounds) to occupants of 75 longhouses in the Sibu District in 1971. In longhouses surveyed, 36% produced enough rice for the full year.

18:Sutlive E,M-5 (1957-1971) 1973 OC6 Iban OC6 Sibu

The Second Division, like all Divisions in Sarawak, contains a mixture of good and poor soils, of peat swamps and shale hills as well as more fertile land. And population increases and shorter periods of fallowing between cultivation, resulted in diminishing yields in some areas of the Second Division.

Population pressures were not only a physical but also a cultural phenomenon. The Ibans' desire for virgin jungle for hill rice farming has long been recognized. By the end of the nineteenth century, even after thousands of their peers had migrated to the Third Division and beyond, the Residents reported an increasing number of litigations over land.[10] Such disputes are rare where there still is plenty of unfelled jungle for the taking (cf. Freeman 1955-22), but most common in the Sibu District where land prices are highly inflated, and needless to say, there is no kampong lama' ("old jungle"). Confirming this point, one reliable source stated,

> "When our grandparents settled in this area, you could travel for a day or two (by dugout and paddle) before you came to another house. Now, you can't go even half-an-hour. When they came, there were no land disputes because land was plentiful. Now, there's no end of cases."

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[10] See Bailey's Reports, SG No. 406, 1 November 1899, and No. 451, 4 August 1903.